ATTACHMENT 1

Francis J. Murphy
Network Engineering Consultants, Inc.
Five Cabot Place, Suite Three
Stoughton, MA 02072
781.344.7206

SUMMARY

President of a telecommunications consulting company with almost 30 years of administrative, operations, marketing and technical experience covering regulatory issues, pricing, costing, central office operations, test center operations and customer premises installation and maintenance operations. Demonstrated success in founding, organizing and managing successful consulting company and staff of highly experienced engineers and regulatory personnel. Proven record of corporate and team leadership, customer service, problem identification and resolution.

EXPERIENCE

President of Network Engineering Consultants, Inc., Stoughton, Massachusetts, 1997 to present. Founded Network Engineering Consultants in 1997 to work with major telecommunications clientele throughout the United States and in Australia. Company specializes in Regulatory Compliance, and Technical Engineering with Cost Modeling Analysis and more.

Independent Consultant to the Telecommunications Industry 1995 to 1997.

NYNEX TRG, Boston, Massachusetts 1990 to 1995

<u>Staff Director - Pricing and Costing</u> (1990 to 1995)

Responsible for cost justification in support of interstate access service rates and Federal Communications Commission (FCC) filings and reporting rate of return information to the FCC.

Integral part of the Billed Party Preference (BPP) Docket Management Team solely responsible for identifying the cost ($120 million) to NYNEX to implement BPP as well as developing industry wide BPP implementation cost analysis ($2.0 billion), and presenting same to the FCC on an Ex Parte basis. Solely responsible for the cost support associated with NYNEX's Open Network Architecture (ONA) and 800 Database filings.

Managed the special access non-recurring rate restructure filing project. This project involved the development of a new non-recurring rate structure and rates for both NYNEX New England and NYNEX New York, the development of appropriate costs, and the coordination of all filing related activities from initial internal approval to customer/stakeholder socialization and implementation. The filing was highly successful as evidenced by timely FCC acceptance and no customer/stakeholder intervention.

NEW ENGLAND TELEPHONE COMPANY, Boston, Massachusetts 1970 to 1990

<u>Manager - Special Service Center</u> (1988 to 1989)

Responsible to plan, design and implement a new test center for special service circuits that consolidated five existing test centers while simultaneously managing a staff of 60 people operating the largest of the five existing Special Service Centers (SSC).

Totally responsible for planning, designing and implementing a 20,000 square foot test center. This included real estate issues, furniture design/selection, communication and test system planning/implementation, labor relations coordination and the physical move itself. Project was completed on schedule and within budget.

Achieved outstanding service results while managing SSC by exceeding the corporate commitment to excellence objectives. The SSC installed 99.3% of all new customer service orders on time and reduced average service outages from 6 hours per case to 4 hours per case.

<u>Manager, Installation and Maintenance</u> (1985 to 1987)

Responsible for managing an organization of approximately 120 people including management, technical and clerical personnel performing installation and maintenance functions on special service and high capacity digital services at customer locations throughout greater Boston with an annual budget of approximately $20 million. Through the development and implementation of various programs and measurement plans (training, productivity measurement, safety, absence control, personnel development) all major objectives were significantly exceeded. Examples include average installation time reductions from 3.6 hours per job to 2.3 hours per job with 98.6% on time installations. This result was achieved despite year over year installation volume increases of 25% and concurrent staff reductions. Simultaneous decreases in year over year maintenance volumes of 10% and decreases in average repair times from 2.6 hours per case to 2.2 hours per case reflect significant improvements in both quality and productivity.

Staff Manager - Metropolitan Special Services Division (1984)

Responsible for administration/management of Division office staff reporting directly to Division Manager. The Metropolitan Special Services Division had overall responsibility for all special services and digital high capacity services provisioning and maintenance operations throughout eastern Massachusetts with an organization of approximately 1,000 people and an annual budget of $120 million. Responsibilities included the development and tracking of the annual budget as well as the development and tracking of services objectives and results. The Division under ran its budget and met all major service objectives. Received outstanding evaluation for this assignment.

Manager - Toll Test Operations (1981 to 1983)

Responsible for central office Toll Test operations in the Brookline and Malden areas. Responsibilities included the central office wiring and overall testing and maintenance of switched circuits, special service circuits and interoffice carrier systems in approximately 12 different central offices with an organization of approximately 70 technical, clerical and management personnel.

Supervisor - Toll Test Operations (1974 to 1980)

Responsible for the supervision of approximately 12 Central Office Technicians performing wiring, testing and maintenance activities on switched circuits, special service circuits and interoffice high capacity carrier systems. Promoted to Manager's position after seven years of demonstrated high performance levels achieving quality service results.

Toll Test Technician (1970 to 1973)

Hired, with no related experience, as Central Office Technician after completing military obligations. Promoted to Supervisor after 3 years of demonstrated aptitude and performance in wiring, testing and maintaining switched circuits, special service circuits and high capacity interoffice carrier systems.

EDUCATION

Bachelor of Arts – Business Management
Boston College, 1986.

SELECTED REGULATORY WITNESSING, TESTIMONY AND COMMENTS

STATE	DATE	DOCKET	SUBJECT
Alabama	2/13/98	25980	Universal Service Fund (USF) Cost Analysis- Hatfield Model
California	5/30/96	R.93-04-003 I.93-04-002	Deposition Re: Avoided Costs
	3/18/97		Declaration Re: Hatfield Model 2.2.2
	4/15/97		Supplemental Declaration Re: Hatfield Model 2.2.2
	7/1/97		Engineering Critique Re: Hatfield Model 3.1
	5/1/98	R.93-04-003	Collocation Opening Comments
	1/1/99	I.93-04-002	Testimony Re: Comments on Non-Recurring Costs (NRC)
	2/8/99	I.93-04-002	Collocation Rebuttal Testimony
Florida	10/98	980696-TP	Witnessing Re: USF/HAI 5.0
Hawaii	8/28/97	7702	Witnessing Re: USF/HAI 5.0
Idaho	3/8/00	GNR-T-97-22 GNR-T-00-2	Direct Testimony Re: FCC Model
	5/24/00	GNR-T-97-22 GNR-T-00-2	Reply Testimony Re: FCC Model & HAI 5.2
Maryland	5/21/01	Case No. 8745	Rebuttal Testimony Re: Modified FCC Model
	6/11/01	Case No. 8745	Surrebuttal Testimony Re: Modified FCC Model
	7/5/01	Case No. 8745	Live Surrebuttal Testimony Re: Modified FCC Model
	7/01	Case No. 8745	Witnessing Re: Modified FCC Model
Nebraska	4/8/98	C-1633	Unbundled Network Elements (UNE) Testimony
	5/98		Witnessing presentation given to PSC, et al.
New Mexico	6/6/97	97-35-TC	UNE Rebuttal Testimony HM 3.1
	6/97	97-35-TC	Witnessing Unbundled Network Elements
Oregon	11/7/97	UT 138 & 139	Reply Testimony Non-Recurring Costs
	12/98	UT 138 & 139	Witnessing Re: Non-Recurring Costs
	1/00	UM 731	Rebuttal Testimony HAI 5.1 & SM

STATE	DATE	DOCKET	SUBJECT
S. Carolina	11/18/97	97-239-C	Rebuttal Testimony Re: HAI 4.0
	3/2/98	97-239-C	Rebuttal Testimony Re: HAI 5.0
	3/98	97-239-C	Witnessing Re: USF
Texas	3/18/98	18515	USF Rebuttal Testimony
	6/5/98	18515	Supplemental Testimony
	6/10/98- 9/16/98		Various Testimony, Replies and Rebuttals
	3/98		Witnessing
Washington	5/12/97	UT960369, -70, -71	Declaration Re: TICM Data
	6/13/97	UT960369, -70, -71	Supplemental UNE Testimony
	9/11/98	UT960369, -70, -71	Supplemental Testimony Re: USF

The FCC Multiple and Varied Affidavits on behalf of and support of clients: 1/30/98, 12/17/98, 1/15/99, 1/25/99, Docket Numbers: 96-45 & 97-160 in support of FOIA's, Petitions For Re-Consideration, Applications for Review, and Opposition to Comments.

Ex-Parte of 2/20/98 RE:HAI 5.0, and 5/7/98 RE: HAI5.0a

Australia Affidavit on behalf of TELSTRA before the Australian Telecommunications Authority Regarding Universal Service Costs, March 1999

ATTACHMENT 2

CARRIER SERVING AREA (CSA) LOOP DESIGN STANDARD

The CSA design standard evolved over time to ensure that the telephone network could readily provide digital services via loop facilities. The standard was implemented in order to allow a local loop to "accommodate a wide range of transmission applications including voice, data, video, sensor control and many others."[1] This standard also was established to avoid expensive reconditioning of cable plant, which would have been necessary in order to provide high-speed services.[2]

Prior to 1980, engineers followed "Resistance Design" ("RD") rules (for loops 0-24 kft in length) and "Long-Route Design" ("LRD") rules (for loops longer than 24 kft). These design rules were developed to ensure that local loops provided satisfactory transmission performance (i.e., signaling and loudness). RD met the performance standards through a combination of cable gauge control and the use of loading coils on loops longer than 18 kft. LRD added electronic range extenders to the design mix. The introduction of Digital Loop Carrier ("DLC") made possible a third design plan, referred to as the "Carrier Serving Area ("CSA") concept." According to the *Bellcore Notes on the Networks,* "Fundamental to all three plans is the notion that designing loop facilities on an individual basis would be prohibitively expensive and extremely difficult to

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[1] AT&T Outside Plant Engineering Handbook (Aug. 1994) at Section 13-1.
[2] *Id.*

administer."[3] The introduction of Digital Switching enabled designers to increase the maximum allowable signaling range from 1300 ohms to 1500 ohms, and the RD and LRD rules were replaced by the Revised Resistance Design ("RRD") and Modified Long-Route Design ("MLRD") rules. At the same time, DLC became the first choice design for loops longer than 24 kft. In addition to the increase in signaling range, the revised plans reduced the amount of bridged-tap allowed, resulting in improved transmission performance.

While the RRD rules permit non-loaded loop lengths of up to 18 kft (including bridged-tap), the introduction of digital services required additional changes to the loop design plan.

The Bellcore Notes on the LEC Networks states the following with regard to the CSA design standard:

> "The evolution to a network that can readily provide digital services via loop facilities led to the Carrier Serving Area (CSA) concept. A CSA is an area that is or may be served by DLC. DLC may be either stand-alone (UDLC) or integrated into the end office switch (IDLC). All loops within a CSA are non-loaded. They are capable of providing on a non-designed basis conventional, voice-grade message service; digital data service up to 64 KBPS; Digital Subscriber Lines (DSLs) for ISDN; and most locally switched, 2-wire, voice-grade special services. Ordinary channels (pair-gain pairs) on the DLC system have a loss of 2dB or less, thus allowing for attenuation in the physical cable within the CSA. Loop length in the CSA is limited by attenuation, not by dc resistance. Bridged-tap lengths are controlled to preserve capability for high-speed, digital operation. <u>CSA design is now used for most loop growth</u>."[4]

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[3] Bellcore Notes on the Networks, Issue 3 (Dec. 1997) SR-2275 at p. 7-68).

[4] *Id.* at p. 7-71 (emphasis added).

Recent documentation released by industry manufacturers recognizes that ILECs adhere to the CSA design standard in order to construct networks that can accommodate advanced digital services. For example, DSC Corporation includes the following in its Litespan Documentation practices:

> "Today the CSA design rules ensure that the quality 2-wire voice transmission and the capability to support advanced digital services, including repeaterless digital data services (DDS), ISDN basic rate transmission (2B+D), high-bit rate digital subscriber line (HDSL), and asymmetrical digital subscriber line (ADSL)."[5]

Additionally, the major telecommunications providers in the industry support the CSA standard. Verizon, Sprint, BellSouth, U S WEST, Southwestern Bell and the Rural Utilities Services have all expressed their support of the CSA standard,[6] and have unanimously opposed the 18kft loop standard.

[5] DSC Litespan Practice, OSP 363-205-010, Issue 6 (July 1997) at p. 42. DSC was acquired by ALCATEL in 1998.

[6] Comments and Reply Comments filed on September 24, 1997 and October 3, 1997 before the Federal Communications Commission by the various parties in the Universal Service Cost Model Docket in response to the FCC's Further Notice of Proposed Rulemaking released July 18, 1997.

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ATTACHMENT 3

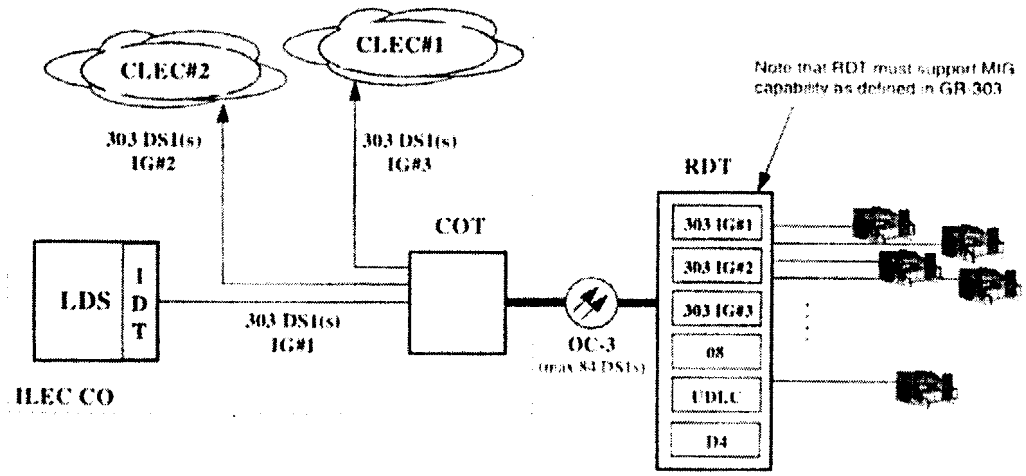
AT&T Communications Of Virginia, Inc.'s And WorldCom Inc.'s Response to Verizon Virginia's Third Set Of Data Requests To AT&T And Fourth Set of Data Requests To WorldCom
CC Docket No. 00-251
July 26, 2001

VZ-VA 51. **Provide examples of specific RBOC wire centers using GR 303 DLC for the unbundling of individual loops, and provide a schematic diagram of how this unbundling takes place.**

AT&T/WCOM RESPONSE:

Neither Verizon nor other RBOCs have provided such information to AT&T/WorldCom. Nonetheless, the mere fact that AT&T/WorldCom cannot cite to examples of RBOC wire centers using GR-303 DLC for the unbundling of individual loops does not mean that it is not technically feasible. See attached file.

GR303
UNBUNDLING DI/



GR-303 IG Local Loop Unbundling Application

ATTACHMENT 4

Exhibit No. FJM-4

TECHNOLOGY FUTURES INC. 13740 Research Boulevard., Suite C-1, Austin, Texas 78750-1859 • (800) TEK-FUTR • (512) 258-8898
Fax: (512) 258-0087 • Internet: http://www.tfi.com • e-mail: info@tfi.com

December 22, 1999

Dr. Jason Zhang
GTE Corporation
600 Hidden Ridge, HQE02D33
Irving, TX 75038

Dear Dr. Zhang,

Technology Futures, Inc. (TFI) offers the following comments concerning the use of one of its reports in the FCC's 10th Report and Order on Universal Service, paragraph 305 and associated footnote 638:

- The FCC incorrectly concluded that the 8% "shell" investments in the TFI Study included all Main Distributing Frame (MDF) and power investments.
- The FCC's proposed adjustment also incorrectly applied the 8% factor to the RUS data which included only investments without MDF and power. The correct factor for the proposed adjustment for the 8% is 8.7%.
- Based on the TFI Study and the FCC's 1996 data, a conservative estimate of the "shell" investment which does not include all MDF and power investment is at least $33 per line for 1999.

Paragraph 305 states:

> *We find that we should adjust the RUS data for MDF and power equipment costs in a way that is more consistent with the way in which these costs are estimated in the depreciation data set. In depreciation data, MDF and power equipment costs are estimated as a percentage of the total cost of the switch, as are all other components of the switch. Based on the estimates of Technology Futures, Inc., we find these costs were eight percent of total cost.[638] Because we are adjusting the RUS data so that they are comparable with the depreciation data, we find it is appropriate to use a comparable method to estimate the portion of total costs attributable to MDF and power equipment. Accordingly, in order to account for the cost of MDF and power equipment omitted from the RUS information, we conclude that the*

> *cost of switches reported in the RUS data should be increased by eight percent.*

Footnote 638 states:

> *Lawrence K. Vanston, Ray L. Hodges, Adrian J. Poitras, Technology Futures, Inc.*, Transforming the Local Exchange Network: Analyses and Forecast of Technology Change *149 (2d ed. 1997) (TFI Study). The terminology used in the TFI study differs somewhat. What TFI calls "shell" is "the common equipment, such as cabling and power equipment, that is not modular and lasts the life of the switch entity." TFI Study at 136. This includes MDF and power investment.*

The footnote acknowledges a difference in terminology between TFI's definition of the "shell" and MDF and power equipment as omitted from the RUS data. There are, in fact, significant differences. It must be understood that the TFI study is a life analysis and was not intended to identify the total cost of power and MDF. The study instead attempts to group the various components of the digital switch into modules with similar life characteristics. These modules are: processor/memory, switching fabric, trunk interface, digital loop carrier interface, baseband (analog) line interface, and shell.

The "shell" is defined on page 136 (TFI Report) as "the common equipment, such as cabling and power equipment, that is not modular and lasts the life of the switch entity." The FCC footnote 638 correctly contains this definition but inappropriately states, "This includes MDF and power investment." The last quote is incorrect when used to infer that it includes the *total* costs attributable to MDF and power. First, a significant portion of MDF costs are the protectors and the outside plant (OSP) cable terminated on the MDF. These costs are not part of the switching account in depreciation studies. The cabling from the line equipment to the MDF is all that is included. Therefore, some, but not all, of the MDF costs are included as "shell" in the TFI study. Second, all of the power equipment is not included in the "shell." There are significant investments in power cables, fuse panels, filters, and low voltage electronic power equipment which is associated with specific modules of the life study. This portion of the power investment was assigned directly to modules other than the "shell" since it would retire along with the equipment it supports.

Even without the additional MDF and power investments identified above, the TFI Study found that the "shell" investment per line based on 1996 FCC data was about $33 per line.[1] The "shell" investment per line for 1999 is expected to be even higher. The MDF is primarily metal works and cables while the power equipment is primarily batteries, copper busses and cables, and chargers. These material intense components do not benefit from technology advances and associated price declines as with other components of the digital switch. In fact, they are most likely to increase over time.

In summary, the TFI report category "shell" includes some, but not all, of the MDF and power costs. Based on the TFI report using the FCC's 1996 data, even without including all the MDF and power investments, the "shell" investment per line in 1996 was $33 per line. The "shell" investment per line for 1999 is expected to be even higher.

Sincerely,

Ray L. Hodges
Senior Consultant